

NKA Pain Management Seminar Fall 2011 Seminar #4

1. Fourth Seminar – Tranquility Meditation

a. Segment 1: Welcome and Introduction [10 minutes]

i. Classical Buddhist instructions for meditation

- 1. “The Greater Discourse on the Foundations of Mindfulness”**
- 2. Tranquility Meditation and Insight Meditation**

b. Segment 2: The Neurophysiology of Meditation

- i. Today we will discuss the fundamental concepts of neuroscience and neurocardiology which underlie the practice of meditation**
- ii. The practice of Meditation and its related activities is thousands of years old, and has been the subject of many religious, philosophical, and scientific investigations**
- iii. There have through the ages been many seemingly outrageous claims for the benefits of meditation, but until the 20th century there were no controlled scientific studies of the phenomena associated with meditation**
- iv. In the 1950's there were a few studies of the relationship between EEG patterns and meditation using a very small universe of subjects – usually only one or two skilled meditators from Japan or China**

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- v. In the 1960's, the number of skilled meditators who could be recruited for these studies increased slightly
- vi. By the late 1960's, however, the practice of Transcendental Meditation was introduced to the Western world by the Beatles, who had travelled to India and met with its creator, the Maharishi Mahesh Yogi
- vii. By the early 1970's, there were over 70,000 people in the US who had been trained in TM, and so the number of meditators who could be recruited for scientific investigations was quite large - PubMed lists about 2,800 articles relating to meditation
- viii. In 1972, cardiologists Robert Keith Wallace and Herbert Benson authored an article about the physiology of meditation which appeared in the February edition of Scientific American. They note that the most important physiological change during meditation is reduction in the rate of metabolism as measured by 7 indicators:
 - 1. Reduced Oxygen consumption
 - 2. Reduced Carbon Dioxide elimination
 - 3. Reduced Respiratory rate

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- 4. Reduced Heart rate**
- 5. Increased Alpha rhythm [reduced Beta rhythm!]**
- 6. Reduced Blood pressure**
- 7. Reduced Muscular tension**
- ix. In 1975 Dr. Benson published his ground-breaking popularization of meditative technique entitled “The Relaxation Response,” in which he presented a 4-part distillation of the meditative process [Cf. with the *Foundations of Mindfulness*]:**
 - 1. A quiet environment**
 - 2. A word or phrase to repeat, or an object on which to direct one’s gaze**
 - 1. a mantram**
 - 2. a prayer**
 - 3. an object**
 - 4. one’s breathing**
 - 3. Adoption of a passive attitude**
 - 4. A comfortable position**
- x. In the 1980’s research on the electrical rhythms of the heart indicated extended our understanding of the way that meditation achieves these effects**

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xi. 3 primary psycho-physiological life-rhythms that regulate all metabolic functions

- 1. Electrical rhythms of the central nervous system = brain wave rhythms**
- 2. Cardiac rhythms of the heart are regulated by chemoreceptors and baroreceptors in the heart and the arteries**
 - 1. Chemoreceptors respond to changes in the amount of carbon dioxide in the blood**
 - 2. Baroreceptors respond to changes in blood pressure or pressure inside the chest cavity caused by the action of the lungs during breathing cycles**
 - 3. The basic heart rhythm is set by the interaction of the sympathetic nervous system, which increases heart rate, and the parasympathetic nervous system, which decreases heart rate**
 - 4. Sympathetic nervous system activity is increased during inhalations and parasympathetic nervous system activity is increased during exhalations.**

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- 5. Thus, the heart rate speeds up during inhalation and slows down during exhalation**
- 6. This change in the heart rate during each breath cycle creates a variable pattern in the underlying rhythms of the heart**
- 7. It is this Heart Rate Variability that is the primary predictor of cardiovascular health**
 - a. Definition of ‘Health’ = Distance from death [Steinhaus, A. H. (1936). Health and physical fitness from the standpoint of the physiologist. *Journal of Health and Physical Education*, 7(4):224]**
- 3. Pulmonary rhythms of our breathing cycle are regulated by complex interactions among chemoreceptors and baroreceptors located in the lungs, the pons, the medulla, and the cerebral cortex of the brain**
- 4. Of these three primary life rhythms, we can deliberately control only one – the breathing rhythm and it is through self-regulation of our breathing patterns that we regulate the rhythms of our heart and our brain because these 3 life**

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rhythms are linked together at the deepest structural levels of our being

- 5. Meditative practices take advantage of this relationship to stabilize and synchronize these life rhythms**
- 6. All of the effects of meditation are regulated by the reduction of breathing rhythms below a minimum threshold – 3 breaths per minute, or one breath every 20 seconds**
- 7. Because the sympathetic responses are controlled by inhalations, and parasympathetic responses are controlled by exhalations, the ratio between these two processes is critical**
- 8. This relationship should be 3 to 1 in favor of parasympathetic activity, or an inhalation of 5 seconds and an exhalation of 15 seconds**
- 9. How do we achieve this rhythm consistently and easily? There is one certain method [and only 1!!!] – what is it?**
 - 1. Class Small Group Discussion**
 - 2. Answer: Humming!**

b. Segment 3: Practice

c. Segment 4: Review and Q&A